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COVERAGE OF 1996 EUROPEAN AIR TRAFFIC FOR THE BASE OF AIRCRAFT DATA (BADA) REVISION 2.5

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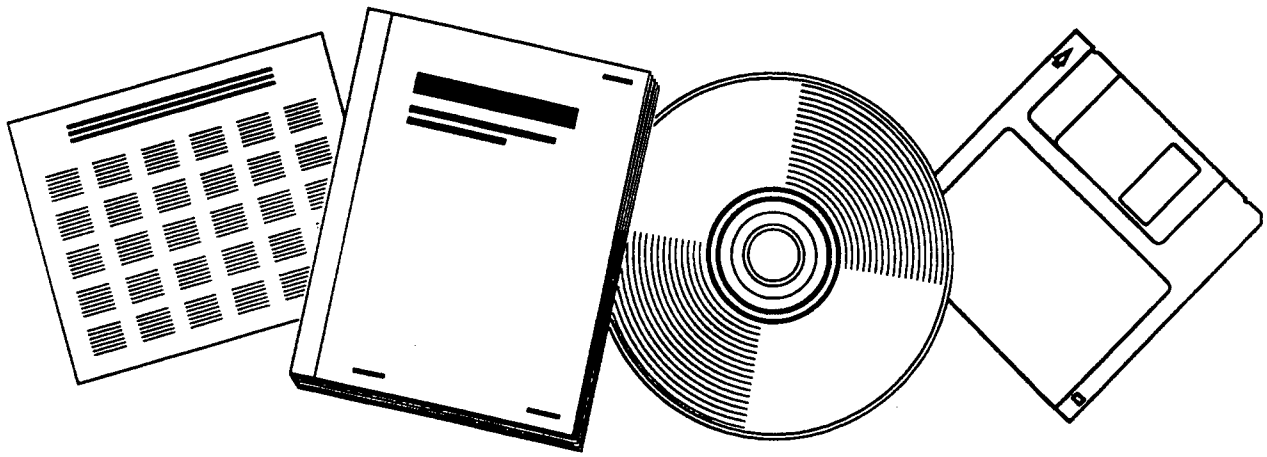

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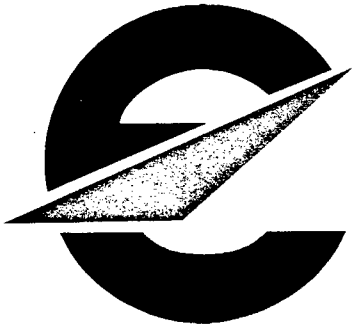

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COVERAGE OF 1996 EUROPEAN AIR TRAFFIC FOR THE BASE OF AIRCRAFT DATA (BADA) REVISION 2.5

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Abstract:

The air traffic statistics in the European CRCO area for 1996 are used to determine the coverage of European air traffic by the Base of Aircraft Data (BADA) Revision 2.5. BADA consists of a set of aircraft models used at the EEC and other European research institutes for aircraft trajectory simulation. The results show that the 69 aircraft types within BADA 2.5 cover 88.9% of the European air traffic. The addition of 2 types would bring the coverage to the target of 90%.

Coverage of 1996 European Air Traffic
by the
Base of Aircraft Data (BADA) Revision 2.5

EUROCONTROL Experimental Centre

Summary

The air traffic statistics in the European CRCO area for 1996 are used to determine the coverage of European air traffic by the Base of Aircraft Data (BADA) Revision 2.5. BADA consists of a set of aircraft models used at the EEC and other European research institutes for aircraft trajectory simulation. The results show that the 69 aircraft types within BADA 2.5 cover 88.9% of the European air traffic. The addition of 2 types would bring the coverage the to the target of 90%.

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1. INTRODUCTION

1.1 Identification and Scope

This document reviews the air traffic statistics for 1996 from the EUROCONTROL Central Route Charges Office (CRCO) in order to determine the coverage of European air traffic provided by BADA (Base of Aircraft Data) Revision 2.5 [RD1].

BADA 2.5 is a collection of ASCII files which specifies operation performance parameters and operating procedure parameters for 69 different aircraft types. This information is designed for use in trajectory simulation and prediction algorithms within the domain of Air Traffic Management (ATM). All files are maintained within a configuration management system at the Eurocontrol Experimental Centre (EEC) at Brétigny-sur-Orge, France.

This document is presented in three sections, including Section 1, the Introduction. A discussion of the coverage statistics is presented in Section 2 with conclusions summarised in Section 3.

1.2 Referenced Documents

RD1 User Manual for the Base of Aircraft Data (BADA) Revision 2.5; EEC Note 1/97; January 1997.

RD2 Aircraft Type Designators; ICAO Document No. 8643 24th Edition; January 1994.

RD3 World Airliner Census; *Flight International*; Issue 25 Sept. - 1 Oct. 1996

RD4 Jane's All the Worlds Aircraft 1982-1983

RD5 Jane's All the Worlds Aircraft 1996-1997

RD6 Aircraft Type Designators; ICAO Document No. 8643 25th Edition; March 1997

RD7 Coverage of 1995 European Air Traffic for the Base of Aircraft (BADA) Revision 2.4, EEC Note 13/96, June 1996

RD8 Technical Note on the coverage of European Air Traffic; CAPO/BADA/TN/95/02; April 1995

1.3 Glossary of Acronyms

A/C	Aircraft
APO	Centre for Aircraft Performance and Operations
ASCII	American Standard Code for the Interchange of Information
ATM	Air Traffic Management
BADA	Base of Aircraft Data
CRCO	Central Route Charges Office
EEC	Eurocontrol Experimental Centre
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
UM	User Manual

2. AIR TRAFFIC STATISTICS

2.1 CRCO Statistics

European air traffic statistics for 1996, as provided by the EUROCONTROL Central Route Charges Office (CRCO), are included in this Note as Appendix A.

The statistics list all aircraft types that flew Instrument Flight Rules (IFR) flights registered with the CRCO in 1996. The aircraft types are listed in descending order based on the number of total flights for each aircraft type. For each aircraft type the following information is provided:

- rank number,
- aircraft type identifier,
- number of transatlantic flights,
- number of non-transatlantic flights,
- total number of flights,
- percentage of flights, and,
- cumulative percentage of flights.

The following summary information can be immediately extracted from the 1996 statistics. This data is compared with 1994 data [RD8] and 1995 data [RD7]

Year	**1996**	**1995**	**1994**
Total Number of Flights:	6095179	5705919	5002575
Total Number of A/C Types:	371	386	437
Number of A/C types for 90% coverage:	53	55	57
Number of A/C types for 99% coverage:	130	133	147
Number of A/C types for 99.9% coverage:	200	198	227

It can be seen from this data that the number of flights in 1996 in the CRCO area increased with 6.8%. This increase is the result of both an increase in traffic share as well as an increase in the CRCO area. One can also see that there is a again a decrease in the total number aircraft types compared to 1995 although not as significant as the decrease in from 1994 to 1995. The number of A/C types required to obtain a certain coverage has remained stable.

The coverage for 1996 is shown graphically in Figure 2.1-1 below.

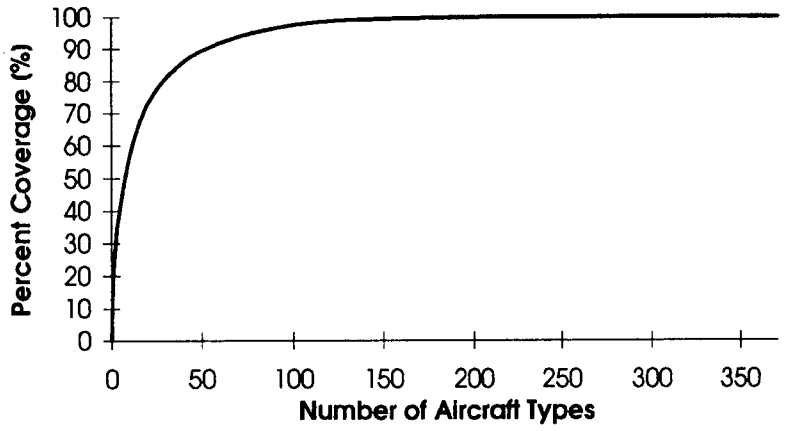

Figure 2.1-1: CRCO Air Traffic

2.2 CRCO Aircraft Identifiers

The aircraft type identifiers used by the CRCO match closely but not completely the standard ICAO aircraft designators [RD2]. In order to compare the CRCO statistics with BADA, several assumptions were made on the meaning of the CRCO identifiers. These assumptions fell into two categories as described below.

(a) CRCO identifiers covering more than one ICAO identifier.

Certain ICAO identifiers were not found at all on the CRCO list. In these cases it was considered impossible that no IFR flights occurred for these aircraft types, thus it was assumed that CRCO identifiers combined some ICAO identifiers. There were 8 examples of this as noted below.

B737	assumed to cover 4 ICAO identifiers, that is: B737 - Boeing 737-100/200 B72S - Boeing 737-300 B73F - Boeing 737-400 B73V - Boeing 737-500
B747	assumed to cover 3 ICAO identifiers, that is: B747 - Boeing 747-100/200/300 B74F - Boeing 747-400 B74S - Boeing 747-SP
C500	assumed to cover 4 ICAO identifiers, that is: C500 - Cessna Citation I C501 - Cessna Citation I-SP C550 - Cessna Citation II-S2 C551 - Cessna Citation II-SP

DC8	assumed to cover 2 ICAO identifiers, that is: DC8 - McDonnell-Douglas DC-8, All Series DC8S - McDonnell-Douglas Super DC-8, All Series
DH8	assumed to cover 2 ICAO identifiers, that is: DH8 - De Havilland Dash-8 DHC-8 DH83 - De Havilland Dash-8 Series 300
LR36	assumed to cover 2 ICAO identifiers, that is: LR35 - Learjet 35 LR36 - Learjet 36
PASE	assumed to cover 2 ICAO identifiers, that is: PASE - Piper Seneca II PA34 - Piper Seneca III
SOCATA	assumed to cover 4 ICAO identifiers, that is: TB09 - Tampico TB-9 TB10 - Tobago TB-10 TB20 - Trinidad TB-20 TB21 - Trinidad TB-21

(b) Unknown CRCO identifiers

In several cases CRCO identifiers did not exist on the ICAO list. In these cases, it was assumed that the CRCO was using an unofficial identifier. Examples of these are described below.

BE9	assumed to be Beech F90	(ICAO identifier BE9F)
C51	assumed to be Lockheed Galaxy	(ICAO identifier C5A)
SHD3	assumed to be Shorts 360	(ICAO identifier SH36)
SC4	assumed to be BAe Jetstream 31	(ICAO identifier BA31)
L100	assumed to be Lockheed Hercules	(ICAO identifier C130)
PIPER	not clear which types	
BEECH	not clear which types	
MOONEY	not clear which types	
CESSNA	not clear which types	

Note that a new ICAO standard for the aircraft designators has become effective on March 27th 1997 [RD6].

2.3 Comparison with BADA

Appendix B provides a list of the aircraft types modelled by BADA 2.5 [RD1]. In this list the aircraft types are ordered alphabetically by the ICAO code. The only model without an official ICAO code is the FGTR generic fighter model. For each aircraft type the percentage of air traffic and ranking as specified by the CRCO statistics is given. For the FGTR the total traffic share of all known fighter types is taken.

Due to the discrepancies between ICAO codes and CRCO type designators, several assumptions were made when assigning traffic percentages. These assumptions are described below. For short to medium range aircraft (B737, DH8 etc.) the number of operating aircraft in Europe is taken since these aircraft will normally belong to European operators. For long range aircraft like the Boeing 747 and McDonnell Douglas DC-8 the number of aircraft operating world-wide is taken since these aircraft could come from other continents as well.

B737 The distribution of air traffic between the B737, B73F, B73S and B73V was assumed to be the same as the distribution of number of aircraft operating in Europe as summarised below. Figures on operating aircraft were taken from *Flight International* [RD3].

A/C Code	Number of Operating Aircraft in Europe [RD3]	Percentage of European Air Traffic
B737	177	4.89
B73S	221	6.10
B73F	186	5.13
B73V	125	3.45
TOTAL	709	19.57

B747 The distribution of air traffic between the B747, B74F, and B74S was assumed to be the same as the distribution of number of aircraft operating world-wide as summarised below. Figures on operating aircraft were taken from *Flight International* [RD3].

A/C Code	Number of Operating Aircraft World-wide[RD3]	Percentage of European Air Traffic
B747	613	1.92
B74F	355	1.12
B74S	28	0.09
TOTAL	996	3.13

C500 It was assumed that the CRCO statistics for the C500 covered four different ICAO codes (C500, C501, C550 and C551). With the help of RD4 and RD5 the following production figures were established:

A/C Code	Number of Aircraft Produced [RD4 / RD5]	Percentage of European Air Traffic
C500	350	0.18
C501	295	0.15
C550	601	0.31
C551	88	0.05
TOTAL	1334	0.69

DH8 The distribution of air traffic between the DH8 and the DH83 was assumed to be the same as the distribution of number of aircraft operating in Europe as summarised below. Figures on operating aircraft were taken from *Flight International* [RD3].

A/C Code	Number of Operating Aircraft in Europe[RD3]	Percentage of European Air Traffic
DH8	33	1.32
DH83	39	1.55
TOTAL	72	2.87

DC8S The distribution of air traffic between the DC8 and the DC8S was assumed to be the same as the distribution of number of aircraft operating world-wide as summarised below. Figures on operating aircraft were taken from *Flight International* [RD3].

A/C Code	Number of Operating Aircraft World-wide[RD3]	Percentage of European Air Traffic
DC8	155	0.16
DC8S	101	0.11
TOTAL	256	0.27

SOCATA The CRCO data shows the SOCATA designator as well as the TB30 and TB70 types. It is therefore assumed that SOCATA covers the TB9, 10, 20 and 21. With the help of RD5 the following production figures were established:

A/C Code	Number of Aircraft Produced [RD5]	Percentage of European Air Traffic
TB9	282	0.06
TB10	592	0.14
TB20	485	0.11
TB21	65	0.02
TOTAL	1424	0.33

For the remaining aircraft types below, there was no information from the Flight International World Airliner Survey or Jane's that could guide the assumption. Thus, more rough assumptions were made.

PA34 It was assumed that the CRCO statistics for the PASE covered two different ICAO codes (PASE and PA34). Thus, the actual percentage for the PA34 was assumed to be one half of the CRCO value (i.e. 0.52/2 = 0.26).

LR35 It was assumed that the CRCO statistics for the LR36 covered two different ICAO codes (LR35 and LR36). Thus, the actual percentage for the LR35 was assumed to be one half of the CRCO value for the LR36 (i.e. 0.38/2 = 0.19).

PA28 Because of the use of unofficial type designators it is not clear under which designator the PA28 is covered. The last known traffic share for the PA28 type is 0.28% in 1994. It is assumed that this has not changed in 1995 and 1996.

FGTR The FGTR model is a generic fighter. In order to establish the traffic share of this model, the traffic share of all fighters in the CRCO data were combined as can be seen below:

Type	Name	No. of Flights
A10A	Fairchild A-10 Thunderbolt II	65
A6	Grumman A-6 Intruder	21
A7	LTV A-7 Corsair II	22
F4	McDonnell-Douglas F4 Phantom	231
F5	Northrop F-5 Freedom Fighter	53
F8	LTV F-8 Crusader	14
F14	Grumman F-14 Tomcat	9
F15	McDonnell-Douglas F-15 Eagle	192
F16	General Dynamics F-16 Fighting Falcon	953
F18	General Dynamics F-18 Hornet	183
F100	Rockwell F-100 Super Sabre	8
F104	Lockheed F-104 Starfighter	107
F111	General Dynamics F-111	2
F1	Dassault-Breguet Mirage F1	98
MIR2	Dassault-Breguet Mirage 2000	160
MIR4	Dassault-Breguet Mirage IV	32
JAGR	Dassault-Breguet Jaguar	415
HAWK	BAe Hawk	836
HUNT	BAe Hunter	3
MRC	Panavia Tornado	2068
HAR	BAe Harrier	543
ALPHJET	Alphajet	854
AMX	AMX International AMX	65
J35	Saab J-35 Draken	1210
MIG29	Mikoyan MiG 29 Fulcrum	40
SB05	Saab 105	1534
MC39	Aermacchi MB-339	128
ETAR	Dassault-Brequet Etendard	48
FOUG	Aerospatiale CM-170 Magister	26
SU27	Sukhoi Su-27	12
O39	Omnipol Albatros L-39	9
SB37	Saab Viggen	8
F117	Lockheed F-117	4

Type	Name	No. of Flights
SB39	Saab J-39 Gripen	4
MIG23	Mikoyan Mig 23 Flogger	2
MIG21	Mikoyan Mig 21 Fishbed	1
SU25	Sukhoi Su-25 Frogfoot	1
SU29	Sukhoi Su-29 Flanker	1
TOTAL:		**9961**

The traffic share for the FGTR model is therefore 9961/6095179 = 0.16%. The actual traffic share might be slightly higher due to the fact that some CRCO designators were not recognised as being fighter aircraft. Note that the type indication is taken from the CRCO data and in some cases this is not the ICAO designator. The traffic share for the military aircraft refers to flights where use is made of civilian air routes and were these flights are subject to civilian control. The traffic share does not include purely operational flights within military sectors where the aircraft are only subject to military control.

With the above assumptions, the list in Appendix B shows that the 69 aircraft types provided in BADA 2.5 cover 88.9 % of the CRCO air traffic. This is an increase of 2.3% compared to the BADA 2.4 coverage of the 1995 air traffic.

Some further comments on the BADA coverage of the CRCO air traffic are given below.

(1) The 69 aircraft types modelled by BADA 2.4 are not the 69 most important types for the CRCO traffic sample. That is, according to the CRCO statistics, the top 69 aircraft types should provide 93.65% coverage. The BADA 2.5 types only provide 88.9% coverage.

(2) There are several aircraft types with a significant proportion of the CRCO air traffic which are not modelled by BADA 2.5. The following 4 A/C types are the most important types not covered by BADA 2.5. The inclusion of the first two aircraft into BADA would increase the coverage to above 90%.

SB20	Saab 2000	0.96 %
E110	Embraer Bandeirante EMB-110	0.35 %
BE9(F)?	Beech F90	0.29 %
BE55	Beech Baron 55	0.23 %

3. CONCLUSIONS

(1) BADA 2.5 currently covers 88.9% of the European air traffic as specified by the Eurocontrol CRCO. The coverage has increased by 2.3% compared to 1995 (86.6%)

(2) The addition of 2 A/C types is required to bring the BADA coverage up to the target of 90%. The 2 A/C types not modelled by BADA 2.5 which have the highest share of European air traffic are:

SB20	Saab 2000
E110	Embrear Bandeirante EMB-110

(3) If one compares the traffic share for the BADA models with the 1995 data one can see that the traffic share for most of the regional aircraft like the FK70, CL65 and BA46 has continued to increase. New in the 1996 data is the SB20 (Saab 2000) which is number 21 in the list. For most of the older aircraft types (DC9, B707, B737) the traffic share has continued to decrease.

(4) The CRCO traffic statistics do not always make use of the ICAO designator. This makes it hard to determine the actual BADA coverage and the priority of models to be added in order to obtain the 90% coverage. For future reviews, the statistics should be obtained such that all aircraft types are identified by the unique ICAO code.

APPENDIX A

CRCO Traffic Statistics for 1996

EUROCONTROL - DIVISION DED-4 - STATFOR

REPARTITION BY AIRCRAFT TYPE FOR 1996
(ENTIRE CRCO AREA, TOTAL NUMBER OF IFR FLIGHTS)

	AIRCRAFT TYPE	TRANSATLANTICS	NON ATLANTICS	TOTAL	%	%+
1	B737	3832	1189164	1192996	19.57	19.57
2	MD80	159	451536	451695	7.41	26.98
3	EA32	88	438552	438640	7.20	34.18
4	B757	10537	215744	226281	3.71	37.89
5	BA46	25	222412	222437	3.65	41.54
6	FK50	23	201788	201811	3.31	44.85
7	B747	81644	109163	190807	3.13	47.98
8	DH8	28	174879	174907	2.87	50.85
9	B767	92104	76019	168123	2.76	53.61
10	AT42	350	157200	157550	2.58	56.20
11	B727	449	134794	135243	2.22	58.41
12	DC9	290	128492	128782	2.11	60.53
13	AT72	0	113101	113101	1.86	62.38
14	SF34	15	109052	109067	1.79	64.17
15	FK10	2	105217	105219	1.73	65.90
16	EA31	9543	90967	100510	1.65	67.55
17	CL65	31	94631	94662	1.55	69.10
18	EA30	570	89198	89768	1.47	70.57
19	BE20	95	70477	70572	1.16	71.73
20	SHD3	2	59466	59468	0.98	72.71
21	SB20	7	58773	58780	0.96	73.67
22	BATP	3	57026	57029	0.94	74.61
23	DC10	31648	21856	53504	0.88	75.49
24	SC4	10	52311	52321	0.86	76.34
25	TU54	11	51223	51234	0.84	77.18
26	FK70	2	49992	49994	0.82	78.00
27	E120	3	45408	45411	0.75	78.75
28	C500	89	42134	42223	0.69	79.44
29	FK27	11	40486	40497	0.66	80.11
30	MD11	21793	17660	39453	0.65	80.75
31	PIPER	54	36245	36299	0.60	81.35
32	SW3	197	35187	35384	0.58	81.93
33	L100	2701	31204	33905	0.56	82.49
34	PASE	13	32788	32801	0.54	83.02
35	L101	15567	16438	32005	0.53	83.55
36	FK28	0	31585	31585	0.52	84.07
37	EA34	14869	15225	30094	0.49	84.56
38	BA11	13	29047	29060	0.48	85.04
39	BA41	23	28797	28820	0.47	85.51
40	CESSNA	53	28599	28652	0.47	85.98
41	HS25	314	27326	27640	0.45	86.43
42	BE90	45	27504	27549	0.45	86.89
43	LR36	355	21376	21731	0.36	87.24
44	E110	3	21483	21486	0.35	87.60
45	TU34	3	21446	21449	0.35	87.95
46	SOCATA	4	19808	19812	0.33	88.27
47	B707	2656	15321	17977	0.29	88.57
48	BE9	11	17928	17939	0.29	88.86
49	D228	21	17220	17241	0.28	89.14
50	D328	27	17203	17230	0.28	89.43
51	DA20	157	16778	16935	0.28	89.70
52	ND16	165	16541	16706	0.27	89.98
53	DC8	5099	11432	16531	0.27	90.25

	AIRCRAFT TYPE	TRANSATLANTICS	NON ATLANTICS	TOTAL	%	%+
54	BE55	18	16479	16497	0.27	90.52
55	DA50	514	14646	15160	0.25	90.77
56	DA10	40	15075	15115	0.25	91.02
57	BEECH	21	15028	15049	0.25	91.26
58	EA33	2348	12324	14672	0.24	91.51
59	CN35	9	14147	14156	0.23	91.74
60	C421	22	12503	12525	0.21	91.94
61	PA31	10	12506	12516	0.21	92.15
62	L188	2	12452	12454	0.20	92.35
63	CL60	1171	10815	11986	0.20	92.55
64	C310	7	11811	11818	0.19	92.74
65	BE30	18	11755	11773	0.19	92.94
66	HS74	0	11222	11222	0.18	93.12
67	O410	5	11211	11216	0.18	93.30
68	DH7	7	10670	10677	0.18	93.48
69	C560	39	10514	10553	0.17	93.65
70	PAYE	10	9913	9923	0.16	93.82
71	IL86	8	9878	9886	0.16	93.98
72	AN24	8	9693	9701	0.16	94.14
73	BN3	0	9578	9578	0.16	94.29
74	GIV	2167	7124	9291	0.15	94.45
75	MOONEY	41	9236	9277	0.15	94.60
76	B777	4978	4143	9121	0.15	94.75
77	S330	0	9003	9003	0.15	94.90
78	IL76	49	8598	8647	0.14	95.04
79	DA90	861	7553	8414	0.14	95.18
80	C650	68	8223	8291	0.14	95.31
81	ND26	0	8231	8231	0.14	95.45
82	IL62	2143	5985	8128	0.13	95.58
83	E121	0	8108	8108	0.13	95.71
84	BE99	1	7749	7750	0.13	95.84
85	SK61	0	7562	7562	0.12	95.96
86	BN2	3	7420	7423	0.12	96.09
87	YK42	6	7193	7199	0.12	96.20
88	LR55	109	6995	7104	0.12	96.32
89	PA42	5	7065	7070	0.12	96.44
90	CV58	1	6940	6941	0.11	96.55
91	C340	24	6829	6853	0.11	96.66
92	HP7	0	6757	6757	0.11	96.77
93	GIII	1278	4908	6186	0.10	96.88
94	C141	2135	3808	5943	0.10	96.97
95	TB70	7	5773	5780	0.09	97.07
96	PAZT	8	5602	5610	0.09	97.16
97	C525	23	5492	5515	0.09	97.25
98	C208	18	5335	5353	0.09	97.34
99	AN26	5	5257	5262	0.09	97.42
100	DH6	16	5185	5201	0.09	97.51
101	YK40	3	5101	5104	0.08	97.59
102	AN12	9	4669	4678	0.08	97.67
103	S350	0	4535	4535	0.07	97.74
104	C414	8	4354	4362	0.07	97.82
105	C406	3	4263	4266	0.07	97.89
106	BH04	0	4141	4141	0.07	97.95
107	C425	17	3820	3837	0.06	98.02
108	PA46	24	3734	3758	0.06	98.08
109	G159	13	3613	3626	0.06	98.14
110	S600	0	3452	3452	0.06	98.20
111	C441	4	3367	3371	0.06	98.25
112	VC8	0	3342	3342	0.05	98.31
113	C51	1736	1551	3287	0.05	98.36
114	BE40	6	3147	3153	0.05	98.41
115	S365	0	2889	2889	0.05	98.46
116	GRUMMAN	5	2799	2804	0.05	98.50

	AIRCRAFT TYPE	TRANSATLANTICS	NON ATLANTICS	TOTAL	%	%+
117	AC6T	8	2657	2665	0.04	98.55
118	C303	2	2580	2582	0.04	98.59
119	MU2	18	2527	2545	0.04	98.63
120	PN68	2	2538	2540	0.04	98.67
121	CONC	2189	306	2495	0.04	98.71
122	P3	750	1488	2238	0.04	98.75
123	LR60	103	1990	2093	0.03	98.79
124	C404	3	2065	2068	0.03	98.82
125	MRC	67	2001	2068	0.03	98.85
126	LR31	8	2007	2015	0.03	98.89
127	ATLA	69	1786	1855	0.03	98.92
128	GII	348	1475	1823	0.03	98.95
129	SK76	1	1794	1795	0.03	98.98
130	PZ76	0	1774	1774	0.03	99.01
131	H53	0	1708	1708	0.03	99.03
132	P180	3	1694	1697	0.03	99.06
133	VC10	231	1403	1634	0.03	99.09
134	BK24	24	1575	1599	0.03	99.11
135	S355	0	1583	1583	0.03	99.14
136	SB05	0	1534	1534	0.03	99.17
137	ROCKWEL	5	1492	1497	0.02	99.19
138	VF14	0	1441	1441	0.02	99.21
139	C411	5	1368	1373	0.02	99.24
140	C17	309	1031	1340	0.02	99.26
141	LR25	8	1308	1316	0.02	99.28
142	IL18	9	1304	1313	0.02	99.30
143	L329	127	1174	1301	0.02	99.32
144	SH5	46	1208	1254	0.02	99.34
145	AN124	283	957	1240	0.02	99.36
146	J35	0	1210	1210	0.02	99.38
147	SW2	1	1209	1210	0.02	99.40
148	ROBIN	0	1197	1197	0.02	99.42
149	E312	0	1184	1184	0.02	99.44
150	CS12	4	1048	1052	0.02	99.46
151	TS60	8	1044	1052	0.02	99.48
152	SH7	0	1005	1005	0.02	99.49
153	F16	25	928	953	0.02	99.51
154	BE60	1	861	862	0.01	99.52
155	ALPHJET	0	854	854	0.01	99.54
156	C337	0	847	847	0.01	99.55
157	E3A	84	753	837	0.01	99.57
158	HAWK	0	836	836	0.01	99.58
159	VC9	0	743	743	0.01	99.59
160	DC3	9	733	742	0.01	99.60
161	PL12	31	680	711	0.01	99.61
162	S316	0	707	707	0.01	99.63
163	NIM	89	607	696	0.01	99.64
164	PL9	1	679	680	0.01	99.65
165	WW25	62	594	656	0.01	99.66
166	N265	24	607	631	0.01	99.67
167	B214	0	587	587	0.01	99.68
168	IL96	371	211	582	0.01	99.69
169	BH12	0	574	574	0.01	99.70
170	MU3	3	560	563	0.01	99.71
171	TB30	0	558	558	0.01	99.72
172	BO05	0	556	556	0.01	99.73
173	O200	0	551	551	0.01	99.74
174	HAR	0	543	543	0.01	99.74
175	PL6A	0	536	536	0.01	99.75
176	S210	0	532	532	0.01	99.76
177	PL7	1	528	529	0.01	99.77
178	MD90	7	499	506	0.01	99.78
179	DC6	0	504	504	0.01	99.79

	AIRCRAFT TYPE	TRANSATLANTICS	NON ATLANTICS	TOTAL	%	%+
180	A3ST	0	499	499	0.01	99.80
181	AP2S	0	464	464	0.01	99.80
182	FK60	0	451	451	0.01	99.81
183	ALIZ	0	434	434	0.01	99.82
184	PL6	0	425	425	0.01	99.82
185	JAGR	0	415	415	0.01	99.83
186	BV07	0	385	385	0.01	99.84
187	G222	13	361	374	0.01	99.84
188	WLL1	0	365	365	0.01	99.85
189	WLSK	0	298	298	0.00	99.85
190	CL21	12	256	268	0.00	99.86
191	C335	0	267	267	0.00	99.86
192	MF15	0	266	266	0.00	99.87
193	AN74	0	260	260	0.00	99.87
194	A109	0	242	242	0.00	99.88
195	F4	6	225	231	0.00	99.88
196	C320	0	224	224	0.00	99.88
197	BH47	0	222	222	0.00	99.89
198	BK17	0	213	213	0.00	99.89
199	C2	4	205	209	0.00	99.89
200	AN32	8	191	199	0.00	99.90
201	F15	47	145	192	0.00	99.90
202	S341	0	190	190	0.00	99.90
203	F18	18	165	183	0.00	99.91
204	G89	1	180	181	0.00	99.91
205	AC50	0	180	180	0.00	99.91
206	BE65	0	176	176	0.00	99.92
207	SK70	0	172	172	0.00	99.92
208	H6	0	162	162	0.00	99.92
209	MIR2	0	160	160	0.00	99.92
210	AN72	0	156	156	0.00	99.93
211	M272	0	152	152	0.00	99.93
212	AN30	0	144	144	0.00	99.93
213	RH22	0	139	139	0.00	99.93
214	P808	0	129	129	0.00	99.93
215	MC39	0	128	128	0.00	99.94
216	AT6	0	126	126	0.00	99.94
217	RM23	0	125	125	0.00	99.94
218	S321	0	119	119	0.00	99.94
219	YS11	0	109	109	0.00	99.94
220	F104	0	107	107	0.00	99.95
221	SM26	0	101	101	0.00	99.95
222	O142	0	99	99	0.00	99.95
223	F1	0	98	98	0.00	99.95
224	WASSMER	0	98	98	0.00	99.95
225	TU204	0	93	93	0.00	99.95
226	AN22	0	85	85	0.00	99.96
227	ML4	2	83	85	0.00	99.96
228	B720	0	84	84	0.00	99.96
229	HF20	0	84	84	0.00	99.96
230	BH22	0	83	83	0.00	99.96
231	P166	0	79	79	0.00	99.96
232	GLASAIR	3	73	76	0.00	99.96
233	CE43	0	73	73	0.00	99.97
234	DH5	2	70	72	0.00	99.97
235	E145	0	70	70	0.00	99.97
236	ST10	0	66	66	0.00	99.97
237	A10A	0	65	65	0.00	99.97
238	AMX	0	65	65	0.00	99.97
239	PN8T	0	64	64	0.00	99.97
240	BEST	0	57	57	0.00	99.97
241	HS14	0	55	55	0.00	99.97
242	SM20	0	54	54	0.00	99.97

	AIRCRAFT TYPE	TRANSATLANTICS	NON ATLANTICS	TOTAL	%	%+
243	F5	1	52	53	0.00	99.98
244	MI8	0	52	52	0.00	99.98
245	P51D	0	52	52	0.00	99.98
246	ETAR	0	48	48	0.00	99.98
247	MIG29	0	40	40	0.00	99.98
248	RH44	0	40	40	0.00	99.98
249	AN28	2	37	39	0.00	99.98
250	B26	0	38	38	0.00	99.98
251	SC01	0	38	38	0.00	99.98
252	AN2	1	34	35	0.00	99.98
253	DO29	2	32	34	0.00	99.98
254	H269	0	34	34	0.00	99.98
255	AC68	0	33	33	0.00	99.98
256	MIR4	0	32	32	0.00	99.98
257	HS04	2	29	31	0.00	99.98
258	043	0	31	31	0.00	99.99
259	A206	0	29	29	0.00	99.99
260	MI17	0	29	29	0.00	99.99
261	P149	1	28	29	0.00	99.99
262	SB91	0	28	28	0.00	99.99
263	BE50	0	27	27	0.00	99.99
264	B52	20	6	26	0.00	99.99
265	FOUG	0	26	26	0.00	99.99
266	LA25	0	26	26	0.00	99.99
267	B1	22	3	25	0.00	99.99
268	U2	10	15	25	0.00	99.99
269	LANCAIR	2	21	23	0.00	99.99
270	S360	0	23	23	0.00	99.99
271	WLW2	0	23	23	0.00	99.99
272	A7	0	22	22	0.00	99.99
273	RV4	0	22	22	0.00	99.99
274	A6	2	19	21	0.00	99.99
275	CS01	0	19	19	0.00	99.99
276	S60	0	19	19	0.00	99.99
277	B100	0	16	16	0.00	99.99
278	DH1	0	15	15	0.00	99.99
279	DV20	0	15	15	0.00	99.99
280	SY6M	0	15	15	0.00	99.99
281	C750	3	11	14	0.00	99.99
282	F8	1	13	14	0.00	99.99
283	0242	0	14	14	0.00	99.99
284	SN4	0	14	14	0.00	99.99
285	GR15	0	13	13	0.00	99.99
286	059	0	13	13	0.00	99.99
287	DC4	0	12	12	0.00	99.99
288	DH2	2	10	12	0.00	100.00
289	E2	2	10	12	0.00	100.00
290	NA1	0	12	12	0.00	100.00
291	SU27	0	12	12	0.00	100.00
292	FH20	0	11	11	0.00	100.00
293	F14	1	8	9	0.00	100.00
294	039	0	9	9	0.00	100.00
295	F100	0	8	8	0.00	100.00
296	KA32	0	8	8	0.00	100.00
297	MI2	0	8	8	0.00	100.00
298	SB37	0	8	8	0.00	100.00
299	AT802	4	3	7	0.00	100.00
300	BL66	0	7	7	0.00	100.00
301	LV8	0	7	7	0.00	100.00
302	MB09	0	7	7	0.00	100.00
303	VAMP	0	7	7	0.00	100.00
304	WW23	0	7	7	0.00	100.00
305	BL31	0	6	6	0.00	100.00

	AIRCRAFT TYPE	TRANSATLANTICS	NON ATLANTICS	TOTAL	%	%+
306	DH4	4	2	6	0.00	100.00
307	PE50	0	6	6	0.00	100.00
308	BR70	0	5	5	0.00	100.00
309	MI26	0	5	5	0.00	100.00
310	S318	0	5	5	0.00	100.00
311	SF25	0	5	5	0.00	100.00
312	AC56	0	4	4	0.00	100.00
313	AN8	0	4	4	0.00	100.00
314	DH82A	0	4	4	0.00	100.00
315	F117	3	1	4	0.00	100.00
316	G164	0	4	4	0.00	100.00
317	O610	0	4	4	0.00	100.00
318	S3	1	3	4	0.00	100.00
319	S319	0	4	4	0.00	100.00
320	SB39	0	4	4	0.00	100.00
321	SU22	0	4	4	0.00	100.00
322	AC70	0	3	3	0.00	100.00
323	BE18	0	3	3	0.00	100.00
324	BH23	0	3	3	0.00	100.00
325	BO08	0	3	3	0.00	100.00
326	EGRET	0	3	3	0.00	100.00
327	HUNT	0	3	3	0.00	100.00
328	LA4	0	3	3	0.00	100.00
329	MGAT	0	3	3	0.00	100.00
330	PROV	0	3	3	0.00	100.00
331	VT10	0	3	3	0.00	100.00
332	BT12	0	2	2	0.00	100.00
333	BUC	0	2	2	0.00	100.00
334	CL44	2	0	2	0.00	100.00
335	DH84	0	2	2	0.00	100.00
336	DO27	0	2	2	0.00	100.00
337	DOSE	0	2	2	0.00	100.00
338	F111	0	2	2	0.00	100.00
339	G44	0	2	2	0.00	100.00
340	HS06	0	2	2	0.00	100.00
341	JU52	0	2	2	0.00	100.00
342	MIG23	0	2	2	0.00	100.00
343	O526	0	2	2	0.00	100.00
344	SM5F	0	2	2	0.00	100.00
345	SU26	0	2	2	0.00	100.00
346	VL90	0	2	2	0.00	100.00
347	YK52	0	2	2	0.00	100.00
348	AH64	0	1	1	0.00	100.00
349	B307	0	1	1	0.00	100.00
350	BO07	0	1	1	0.00	100.00
351	BT10	0	1	1	0.00	100.00
352	CH9	0	1	1	0.00	100.00
353	GR09	0	1	1	0.00	100.00
354	H2	0	1	1	0.00	100.00
355	IAR99	0	1	1	0.00	100.00
356	IL38	0	1	1	0.00	100.00
357	M55	0	1	1	0.00	100.00
358	MC6	0	1	1	0.00	100.00
359	MET	0	1	1	0.00	100.00
360	MI24	0	1	1	0.00	100.00
361	MI28	0	1	1	0.00	100.00
362	MIG21	0	1	1	0.00	100.00
363	MJET	0	1	1	0.00	100.00
364	OA7	0	1	1	0.00	100.00
365	PI51	0	1	1	0.00	100.00
366	SU25	0	1	1	0.00	100.00
367	SU29	0	1	1	0.00	100.00
368	SU37	0	1	1	0.00	100.00

	AIRCRAFT TYPE	TRANSATLANTICS	NON ATLANTICS	TOTAL	%	%+
369	T33	0	1	1	0.00	100.00
370	TU142	0	1	1	0.00	100.00
371	W3	0	1	1	0.00	100.00

T O T A L

AIRCRAFT TYPES	TRANSATLANTICS	NON ATLANTICS	TOTAL
371	321288	5773891	6095179

APPENDIX B

BADA 2.5 Coverage Statistics

ICAO Code	Aircraft Type	Traffic %	CRCO Rank	Comments
AT42	ATR 42	2.58	10	
AT72	ATR 72	1.86	13	
B707	Boeing 707, All Series	0.29	47	
B727	Boeing 727, All Series	2.22	11	
B737	Boeing 737-100/200	4.89	1	assumed 25% of CRCO B737 traffic (ref. Section 2.3)
B73F	Boeing 737-400	5.13	1	assumed 26.2% of CRCO B737 traffic (ref. Section 2.3)
B73S	Boeing 737-300	6.10	1	assumed 31.1% of CRCO B737 traffic (ref. Section 2.3)
B73V	Boeing 737-500	3.45	1	assumed 17.6% of CRCO B737 traffic (ref. Section 2.3)
B747	Boeing 747-100/200/300	1.92	7	assumed 61.5% of CRCO B747 traffic (ref. Section 2.3)
B74F	Boeing 747-400	1.12	7	assumed 35.6% of CRCO B747 traffic (ref. Section 2.3)
B757	Boeing 757, All Series	3.71	4	
B767	Boeing 767, All Series	2.76	9	
BA11	BAC 1.11, All Series	0.48	38	
BA31	BAe Jetstream 31	0.86	24	called SC4 by CRCO
BA41	BAe Jetstream 41	0.47	39	
BA46	BAe 146-100/200/300, RJ Series	3.65	5	
BATP	BAe Advanced Turboprop	0.94	22	
BE20	Beech Super King Air 200 / Huron	1.16	19	
BE90	Beech King Air 90	0.45	42	
BE99	Beech Airline C99	0.13	84	
C130	Lockheed Hercules	0.56	33	called L100 by CRCO
C421	Cessna C-421 Golden Eagle	0.21	60	
C550	Cessna Citation II-S2	0.31	28	assumed 45% of CRCO C500 traffic (ref. Section 2.3)
C560	Cessna Citation V	0.17	69	
CL60	Canadair Challenger 600/601	0.20	63	
CL65	Canadair Regional Jet	1.55	17	
D228	Dornier 228-100/200	0.28	49	
D328	Dornier 328	0.28	50	
DA01	Dassault Mercure 100	0.00	—	out of service since 1/5/95
DA10	Dassault Falcon 10	0.25	56	
DA20	Dassault Falcon 20-FJF/C/D/E/F	0.28	51	
DA50	Dassault Falcon 50	0.25	55	
DA90	Dassault Falcon 900	0.14	79	
DC8S	McDonnell-Douglas Super DC-8, All Series	0.11	53	assumed 39.4% of CRCO DC8 traffic (ref. Section2.3)
DC9	McDonnell-Douglas DC-9	2.11	12	
DC10	McDonnell-Douglas DC-10	0.88	23	
DH8	De Havilland Dash 8	1.32	8	assumed 45.8% of CRCO DH8 traffic (ref. Section 2.3)
DH83	De Havilland Dash 8 -300	1.55	8	assumed 54.2% of CRCO DH8 traffic (ref. Section 2.3)
E120	Embraer Brasilia EMB-120/HH/RT	0.75	27	
EA30	Airbus A300	1.47	18	
EA31	Airbus A310	1.65	16	
EA32	Airbus A320	7.22	3	
EA33	Airbus A330	0.24	58	
EA34	Airbus A340	0.49	37	
FGTR	Generic Fighter	0.16	**	assumed 0.16% of CRCO traffic (ref. Section 2.3)
FK10	Fokker 100	1.73	15	
FK27	Fokker Friendship F27	0.66	29	
FK28	Fokker Fellowship F28	0.52	36	
FK50	Fokker 50	3.31	6	
FK70	Fokker 70	0.82	26	
HS25	HS 125 Series 400/700/800, BAe-125/800	0.45	41	
L101	Lockheed L-1011 Tristar	0.53	35	
LR35	Learjet 35	0.18	43	assumed 50% of CRCO LR36 traffic (ref. Sec. 2.3)
MD11	McDonnell-Douglas MD-11	0.65	30	
MD80	McDonnell-Douglas MD-80/81/82/83/87/88	7.41	2	
MU2	Mitsubishi Marquise/Solitaire	0.04	119	
ND16	Aerospatiale Transall C160	0.27	52	
PA28	Piper Cherokee Archer/Dakota/Warrior	0.24	**	assumed identical traffic share as 1994 (ref. Sec. 2.3)
PA31	Piper Chieftain/Mojave/Navaho	0.21	61	
PA34	Piper PA34-200T Seneca III	0.27	34	assumed 50% of CRCO PASE traffic
PA42	Piper Cheyenne III/IV, 400SL	0.12	89	
PAYE	Piper Cheyenne II	0.16	70	
PAZT	Piper Aztec	0.09	96	
SF34	Saab Fairchild 340	1.79	14	
SH36	Shorts 360	0.98	20	called SHD3 by CRCO

ICAO Code	Aircraft Type	Traffic %	CRCO Rank	Comments (continued)
SW3	Fairchild Merlin IVC / Metro III	0.58	32	
TB20	Aerospatiale Trinidad TB-20	0.11	46	assumed 34% of SOCATA traffic (ref. Sec 2.3)
TU34	Tupulev TU-134/134A/B	0.35	45	
TU54	Tupulev TU-154/154A/B/B2/C/M	0.84	25	
	TOTAL OF 69 TYPES	**88.91**		

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